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Contributing Editors (Continued)

Future of the Institute

By Thomas A. Wright

Chemists must get together to classify all the grades of the profession. NRA will affect the chemist whether he adopts a code or not.

IN A rash moment borne of an intense interest in the subject and of a desire to help in orienting our ideas, your speaker accepted the invitation to open a discussion on the future of The American Institute of Chemists. An attempt will be made to suggest a general course that should react to the benefit of the Institute or, more vital still, to the craft in general. After all, we should never lose sight of the fact that institutes or societies are the means, not the end.

It is well to remind ourselves from time to time that the human equation is what we are interested in. Science itself is a means, not an end. The welfare of the man is paramount to the welfare of the profession. If we keep that always before us, we will never go far afield or waste our efforts.

For purposes of discussion, suppose we take as a thesis the following group of questions:

1. Has not the real chemist tended to be not only too individualistic but also perhaps too self-centered?
2. May we not get further as a class if we start building up from the bottom instead of looking down rather superciliously on those below?
3. Would we not help ourselves more effectively by recognizing all the members of the craft no matter how humble?

When we see that justice is done to all those considered as "chemists"

by themselves, by their relatives or friends, or by the general public we will get somewhere and not before. There are by the 1930 census, over 50,000 listed as "chemists" and "chemical engineers" and 16,000 listed separately as "laboratory technicians."

The great majority of chemists, unlike the lawyer, doctor, or consulting chemist, are employees. They may not receive much, but at any rate they are on the receiving end; and the rôle of the employee is to the fore as never before. Apparently in the future he is not only more than ever to be considered from the humanistic side, but industry and business has discovered that an employee is a consumer.

Furthermore the employee has not only been given a voice as such under the National Recovery Act, but he has been given a VOICE, as a consumer. So, as a group, the employee is now articulate as never before. Those further organized in a horizontal grouping called a trade union, or society or association or institute, call it what you will, are in a position to make their voice more emphatic. And it is the aggressive, emphatic, and insistent group that gets a hearing—provided, it is also fortified with a fairly definite plan which it is prepared to prove has the backing of, and is really in the interests of, *all* those concerned.

IT therefore seems that we must first find out just who are these sixty-odd thousand? What do they do? How should they be graded or classed? How many are of Fellow caliber? Of Associate? Of Student? Having ascertained or guessed those, then what are we going to do with the rest? Are the balance in the majority, or are we?

It appears to be our job to find this out and take the necessary steps. Certainly no one claiming rightly or wrongly to be a chemist can object if those who have proved their right by education, experience, or other professional qualifications, initiate and guide this grading and classification.

Apparently the civil or mechanical engineer or the architect has had no difficulty, not only in his own mind but in that of the public, in differentiating between a draughtsman and a chain-man. Who ever hears of a draughtsman, a chain-man, or line-man calling or even considering himself an engineer? The engineer classes them—note that!

This has all been said before, no doubt. But it was often considered either academic or perhaps dangerous or radical by some (depending on who voiced it); it fell on the deaf ears of others; and it has been the subject of deep thought and sincere action by still others. But a real incentive has been lacking except in a case like that of the governmental employee. Now we have an incentive, and a real one, requiring

some action now and more later. Codes are being written by the hundreds. In general they refer only to a minimum wage for the lowest type of labor and, contrary to a general view, $12.00 per week is not the lowest rate. Some allow 80% of $12.00 or even a lower one, provided it is not less than that paid June 15, 1929, plus 25%.

However, there is no doubt that as time goes on more and more codes will show classes of employees. The proposed code for Commercial Testing Laboratories when it is submitted to Washington will carry such a graduation. So too will that of the professional engineer.

As in all other codes, those getting over $35.00 per week are exempt from the hourly and other employee provisions. Apparently if you get over $35.00 you are without doubt a professional man. What the status is under that wage is not explicitly stated in any code so far as is known. But in addition the C.T.L. code, as we call it, also recognizes the terms or grades of technical employee and technical assistant. Probably 80–90% of the work done in commercial or independent testing laboratories is chemical or metallurgical in nature. The rest is chiefly mechanical and electrical. Despite the fact that the work is basically chemical, no mention is made of chemists except by inference as previously mentioned.

Now suppose the Administrator of NRA, or an assistant, asks for advice and guidance in reference to the labor provisions on any of these codes as affecting chemists. In fact how is he going to know chemists are affected? Suppose he asks what is the difference between a professional man getting $35.00 or over and a Technical Employee getting $34.99 and under. Or asks for the difference between a technical man and a technical assistant? The National Council of the Institute, like good Americans, have offered their services. What will be the answer when the call comes? Going further, what are we doing as members; as a chapter; as an Institute, to meet this challenge?

The Blue Eagle may be temporary, it is true. The National Recovery Act may officially end June 16, 1935; but the great purpose behind it all will not die. We may see changes in policies of the moment, in rules, in administrators, it is true, but the essentials will live. Labor is to the fore, and the laborer is worthy of his hire.

But there is still another point to be emphasized. Speaking as a member of both the employer and employee class as a consulting chemist may justly do (if assistants are employed) it is well to stress that neither group should dictate the classification and wages of the employee. While one of the underlying thoughts in the speaker's mind is that of our duty to those under us, nevertheless it would seem obvious

that chemists and not bricklayers, iron workers, or miners are best fitted to advise on these questions. Yet it would be well to keep in mind also, so far as wages alone are concerned, that the wages paid to a laboratory helper are affected by those paid to the porter, cleaner, watchman, handy man, or even clerical help. And that paid the laboratory helper or boy affects in turn the technical assistant, and he the technical employee (whatever that is) and he the "professional" man—the chemist!—the one who gets over $35.00 a week!

Make no mistake about it, wages will be leveled. But hiring for as little wages as possible will go on as before. Industry (and some laboratory heads) will pay no more than it must. Industry will hire the lowest grade it can possibly get away with. If it does grading too, we have only ourselves to blame.

Summary

1. In the consideration, appreciation, and constant study of the interests of the neophyte, technician, laboratory operator, or chemist's handy man—as well as the classes we now recognize;
2. In the development and publicizing of such a plan;
3. In the active aggressive carrying out of the purpose, lies the future of the Institute.

Think it over.

Commercial Testing Laboratories Code

THE code prepared by the committee of the testing laboratories has reached its final form and has been sent to Washington for approval by President Roosevelt. Its principal points, in a considerably abridged version, are as follows:

Definitions

The "Commercial Testing Laboratory Industry" includes services in analysis and/or testing, and/or conducting a laboratory for that purpose, and/or making technical investigations or studies, and/or performing inspections of commercial products, and including any of the following:

(1) Biological, chemical, electrical, mechanical, or other physical tests and measurements.

(2) Valuation of materials.

(3) Determination and/or evaluation of properties and characteristics.

(4) Technical investigations or studies (exclusive of consulting work) involving the use of laboratory facilities.

The term "commercial testing laboratory" shall not include engineering or chemical consultants or consulting organizations which do not operate laboratories performing the type of services included in the above definition.

It is intended that the term "commercial testing laboratory" as used herein shall mean and shall include any laboratory, whether Federal, State or Municipal; educational or endowed institution; or of a business when such a laboratory shall solicit or perform such commercial service for the general public, the Government, or any other company or institution or individual not financially controlling or financially controlled by the laboratory performing the service.

"Technical employee" means an employee primarily engaged in technical activities requiring skill and experience in the business of testing. "Technical assistant" means an employee engaged in similar work but operating under supervision.

Hours

No employee to work in excess of an average of 40 hours per week for any 90-day period, nor more than 48 hours in any one week, with the following exceptions:[1]

(*a*) Executives and their personal secretaries

(*b*) Outside salesmen

(*c*) Supervisory employees receiving in excess of thirty-five dollars per week

(*d*) Mechanics engaged in maintenance and repair work.

[1] It is provided also:

(*a*) That if mechanics, due to emergency, are required to work more than forty-eight (48) hours in any one week, they shall be paid for such time as may be in excess of forty-eight (48) hours at a rate not less than one and one-third times the prevailing rate; and

(*b*) That watchmen may be permitted to work not to exceed fifty-six (56) hours per week.

Minimum Wages

	Per Week of 40 Hours	Equivalent Hourly Rate
Technical employees	$24.00	$0.60
Technical assistants	17.00	0.425
Office and clerical employees (except as provided below[1])	14.00	0.35

The "Code Authority" shall have power to classify and define employees. In certain circumstances, the Code Authority, subject to the approval of the Administrator, may reduce the foregoing minimum wages by not more than 15%, or may authorize minimum wages not less than 25% in excess of those paid for the same class of work on June 16, 1933.

General Labor Provisions

1. No person under sixteen shall be employed, nor anyone under eighteen at operations or occupations hazardous in nature or detrimental to health.
2. Employees shall have the right to organize and bargain collectively through representatives of their own choosing.
3. No employee and no one seeking employment shall be required to join any company union or to refrain from joining, organizing, or assisting a labor organization of his own choosing.
4. Any member of the industry shall have the right to appeal to the Administrator from decisions of the Code Authority.

Administration

The Code Authority shall consist of not less than ten individuals chosen by a fair method of selection to be approved by the Administrator.

Bribery, etc. Paying or allowing or offering any client's employee any rebate, commission, gratuity, or concession, in connection with the sale of services.

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[1] Except superannuated or low-efficiency employees, office and errand boys or girls, porters, cleaners, etc.; provided that if there be more than one such employee in any given place of business, the total of such employees shall not exceed five per cent (5%) of the total employees at that place of business.

Interference with Contracts. Maliciously inducing or attempting to induce the violation of an order or a contract for services.

Defamation. The defamation of competitors by falsely imputing to them dishonorable conduct, inability to perform contracts, questionable credit standing, or by false disparagement of the quality of their service.

Services Below Cost. The furnishing of any competitive service(s) at a fee or charge below minimum prices as fixed under this Code or, pending the establishment of or in the absence of minimum fees, below total cost.

Unfair Competition. The utilization of laboratory or testing facilities of individuals, firms, corporations, or institutions, whose principal activities are not of a related professional character to compete, without charge or at prices below total cost or below the minimum fees fixed by the Code Authority, with established commercial testing laboratories; provided, however, that nothing herein shall be construed to prevent any manufacturer from rendering experimental laboratory services which are essentially involved in the development and application of his product.

Forbidden Trade Practices

Misleading Devices. The employment of any insignia, symbol, form, stationery, or other matter likely to deceive the client or the public as to the identity of the laboratory.

Misrepresentation. Misrepresentation of the character and extent of service to be or actually performed for clients.

What of the Sub-neophyte?

By William W. Winship

The Institute's responsibility to the sub-debs of the profession.

ONE of our sister societies offers reduced rates to high school students attending its semi-annual conventions. The chemical expositions give special courses for college students. What effort is the Institute making to select its future membership from either the neophyte (college) or sub-neophyte (high school) classes and to raise the standards of both chemical groups? This paper offers a few suggestions for high school chemical activities whose sponsorship by the Institute would, I believe, be proper and profitable.

Chemistry's grip upon American youth is as great as we can expect in view of the somewhat esoteric character of the subject and its presentation. Electricity and other manifestations of physical science impinge directly upon daily life, but the chemical processes upon which existence itself depends are usually accepted with complete unconsciousness until high school is reached. Then the new science is revealed, in the exceptional case, as a fascinating field for mental exploration, or more commonly, as merely another steep grade to be made before graduation.

High school chemistry as taught in the smaller cities and villages often shares honors with biology; and the latter science, with its obvious relations to human bodily processes, is likely to claim the prior interest. Lacking a chemically minded home environment or some special stimulus like that offered to young visitors by the Hall of Science at the Century of Progress, our own science is likely to remain latent in its

appeal at least until college years, when inevitably some orientation toward life's goal has already taken place. Interest in photography can, however, in the hands of competent instructors, be made an effective entrance to chemical knowledge. Photo-chemistry is not usually taught to chemical beginners but here are the foundations already laid, waiting to be intelligently exposed to the amateur portrait artist. Truly, the Institute's purpose is fostering the interests of the already hatched, rather than the embryo, chemist. However, to fulfill this function best, planning should anticipate the formation of the embryo. What can, or should, the Institute do to assist in selecting from grade or high school the human material which will most profitably develop the chemist of the future, and assist in our avowed aim of maintaining an American chemical body of the first rank?

Our own chemical meetings unfortunately often tax present facilities to accommodate members and friends of the cooperating societies. Otherwise we might often find subjects of distinct interest to the tyro. An outstanding instance of this kind was Dr. Gettler's talk on chemistry in the detection of crime, given a few years since.

A serious deficiency in our regular chemical society membership, at least in the New York metropolitan area, is the almost complete absence of high school chemistry teachers. If we admit the premise that the Institute should assist in a selective process antedating college, how can this be accomplished without thorough teacher cooperation?

CHEMICAL unemployment statistics make distressing reading, although we may have suffered less than some of the vocations once considered more essential. There are probably too many "chemists" at the moment, just as there are too many farmers, stockbrokers, and carpenters. If too much stress has been placed upon the scientific professions in recent years, so that some overcrowding inevitably exists in chemistry, have we a useful rôle to play in helping to regulate the quality of students even though this may reduce the total number recommended for matriculation?

Lectures with demonstrations, if expertly given, arouse the curiosity and direct the attention of those not definitely committed to chemical courses. If adequately prepared with an eye to the histrionic, these talks may well be given before an entire school assembly, and means employed to ascertain individual reactions for subsequent cultivation along chemical lines. Have the Institute members time to spare for such work?

The bookbinder's apprentice Faraday had his scientific nature aroused

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through attendance at Sir Humphry Davy's demonstrations, and Faraday's own genius stood revealed. In after years Faraday recognized and extended the appeal of science to the young through his own juvenile lectures at the Royal Institution.

Just as regional chemical meetings are sometimes held by our chemical societies, group chemical lectures, comprising perhaps the high schools of a county or a city district might be held, with addresses by outstanding members of the Institute. Attendance could be restricted to the best chemical students in the district covered, and their assistance might be enlisted in the active preparations for the meeting.

Chemistry exhibits in the high schools, whether sponsored by the chemical student body or by a chemical club composed of students, are frequently productive of popular interest, react on those preparing and in charge of the exhibit, and bring about a crystallization of interest among non-chemical students. If the school gives yearly exhibitions of pupils' work, such products as soaps, dyes, inks, etc., made by the chemical department, are sure to arouse favorable notice. The amateur chemistry club is potentially valuable either extra-curricular or as a part of the school program. The former may well supplement the latter.

SCHOOL decorations usually favor the classical, and it is seldom that pictures of chemical celebrities or scenes connected with their lives, are shown. Should not the Institute encourage hanging Tenier's or other alchemical pictures, the scene of Lavoisier's tragic arrest during the French revolution, or similar works of art? Suitably inscribed with brief explanatory matter, they cannot fail to be of practical as well as artistic value. The histories of chemical celebrities may be made the means of stimulating interest in their scientific attainments. What more picturesque careers can be connected with any calling than those of Priestley, Rumford, and the Curie family?

One agent not commonly employed in chemical teaching in the schools, the phonograph, seems well adapted to disseminating the talks of our best chemical speakers, whose time permits but few appearances in person at these institutions. If accompanied by a set of experiments handled by a trained assistant, these records have great potential teaching value.

Lantern slides for presenting chemical facts and theories and illustrating chemical processes are effective and inexpensive, and do not require expert manipulation. The Institute could aid in preparing such series for high school presentation and in assuring that those in charge

of their use were thoroughly familiarized in advance with their scope, a frequent hiatus in the use of such material.

The motion picture is more engrossing than the stereopticon but requires special equipment and trained operators. When employed in school chemistry propaganda, explanations giving the underlying chemical facts should be frequently interspersed. Scientific "talkies" such as Langmuir's on oil films have fascinating possibilities when available.

Tickets to our chemical expositions would be suitable rewards for outstanding high school chemistry work. The Institute could perform a real service here with advantage to the pupils, the exhibition authorities, and the exhibitors. Reduction in the hordes of sightseers of school age who frequently crowd our chemical shows, might be an incidental benefit.

Vocational directors have great responsibilities in advising high school students regarding their undergraduate and postgraduate studies, but how much specialized help do the former receive from the various arts and sciences? Conceivably our Institute has here a fruitful field in supplying such directors with information and in developing with them bases for the selection of chemically minded students.

A particularly promising hunting ground for active chemical human material lies, I believe, in evening chemical classes of colleges, and of technical and high schools. Those pursuing evening studies constitute a special group anxious to progress by application to their science and avid to employ any means that will legitimately further these ends Encouraging such students to attend the meetings of the Institute, with membership as an ultimate goal, would seem to be directly to our interest.

I leave these three questions before the Institute:

Have we a responsibility to the chemistry sub-neophyte?

In what way can this best be assumed and developed?

Should such a program be initiated now or postponed until more prosperous times?

Specialization*

By Max Trumper

Need for coordinating specialties. Developments in neighboring sciences often important. The essential unity of science.

SPECIALIZATION assumes that knowledge is divisible. The enormous growth of our scientific literature has created more and more specialties. The flood of researches has brought specialization within specialties. It has been stated that we now need abstractors of abstracts and reviewers of reviews. Each one of these specialities constitutes a field of knowledge sufficiently vast for a man to know much within it and little outside of it.

An abundance of books have been written for and by specialists, but only occasionally do we find an author who has attempted to interpret specialized knowledge to the non-specialist. While the specialties have not been irrevocably defined, they have been sufficiently accepted to make the orthodox research worker confine his studies to a limited field. As a rule the young scientist studiously avoids approaching a neighboring specialty. He is afraid that in doing so he would become unscientific. In this way specialization tends to wall up the divisions which it has created, with the result that few who have entered the precincts of a specialty can climb or even see over the dividing walls into the grounds of a neighboring specialty. As a result we often have scientific isolation. There is an accumulated mass of unused information, and a viewpoint distorted because it has not been correlated.

For the past few decades many colleges and universities have had excellent courses in physics and chemistry. Yet the merger of these two subjects has taken place reluctantly over a period of years. It remained for outsiders—two botanists, Pfeffer in Germany in 1877 and DeVries in Holland in 1884—to initiate the experiments which marked the birth of physical chemistry. They studied the movement of sap and measured the osmotic pressures of salt and sugar solutions. Then van't Hoff and the Swedish chemist, Arrhenius, reared this infant science, physical chemistry, to a healthy maturity. In 1887 Arrhenius postulated that when electrolytes were dissolved in water they were dissoci-

* An address delivered before the Pennsylvania Chapter.

ated into their corresponding ions and that it was these ions which conducted the electric current. His theory of ionic dissociation revolutionized chemistry and has undergone but slight alteration even in the recent researches of physicists and physical chemists. Yet only during the past decade has Arrhenius' concept been applied widely in science and in industry. Many universities were for years firmly opposed to a course in physical chemistry; and when the teaching of physical chemistry was finally permitted, this specialty was often tolerated like a stepchild.

Scientists are naturally cautious about accepting new concepts, but it is difficult to decide where caution ends and prejudice or ignorance begins. Why did this theory of incomplete ionic dissociation take two decades to become generally accepted by the specialists in chemical science? I think our answer is to be found in Pasteur's statement concerning the opposition of the leaders of science in his day to his revolutionary work—founding the new science of bacteriology. Pasteur said, "If it is painful to tenants to leave a house in which they have spent their youth, what must it be to break with one's whole education?"

Yet, slow though they are to accept new theories, scientists often overrate these concepts when once accepted. They await for an abundance of experimental data which often require years of research and discussion, but then, when they are sure beyond any doubt, enthusiasm replaces caution, and the pendulum swings to the other extreme. In the recent past the chemical literature has been crowded with reports on H-ion studies. While many of these studies are of significance, pH represents only a good tool—a new and finer scale of measure—but does not tell the whole story. In this connection I quote from that internationally known French chemist, Emeritus Professor Henry M. Le Chatelier, the man who established the laws of chemical equilibrium which bear his name. He says, "All the actual theory involving pH will perhaps profit, if the concentration of that fictitious entity known as 'hydrogen ion' is replaced by the product of two concrete values: the concentration and the strength of the acid, the latter being measured by the equilibrium constant of the acid against a given standard salt. Very probably, the future will see marked changes in the theories as to the electrolytic composition of solution, while the concentration and the strength of an acid are immutable magnitudes." When a specialty thus becomes for a time the fashion, there is danger that enthusiastic workers who know neither the significance nor the limitations of the subject merely make the mechanical measurements, so that their research may include the latest thing in chemistry.

AT TIMES, the progress in a neighboring field contributes more to the advancement of science across the border than it does to its own immediate subject.

In my own field of medical chemistry and toxicology I feel the importance of familiarizing myself with the progress of those botanists who are relating their subject to chemistry. Studies are now being made on the stimulating effects of manganese, copper, boron, and other elements on the growth of plants. These studies in botany are also being extended into the field of physiological chemistry. This correlation of the chemistry of the soil and of plant growth with their resulting effects upon the human system now constitutes an important branch of physiological chemistry. McCollum of Johns Hopkins helped to focus attention on the importance of the inorganic constituents in the diet. Today we know that the copper content of mothers' milk is three times that of cows' milk. Thus small amounts of copper are being used to combat nutritional anemia in conjunction with the use of iron in the diet. We now know that there is a definite relationship between the boron content of oranges with the boron content of the water of the irrigated areas of the West. The potential danger of boric acid as a food preservative has long been recognized in this country as well as in the leading nations of Europe. The fact that boric acid is used as an eye lotion has helped to create an impression of harmlessness. While there are no immediate effects on the absorption of small quantities of boric acid, when boric acid accumulates in the system toxic symptoms such as deranged digestion, loss of weight, and damage to the kidneys result.

AN INTERESTING development the past few years has been the application of plant physiology to medical problems. Dr. David I. Macht for a number of years has made studies on the comparative reactions of animal and plant protoplasm to various drugs and poisons. He has tested the presence of toxic substances in blood, saliva, sweat, and other secretions, by measuring the growth of roots of various seedlings, also the growth of stems, and transpiration of water through stomata of leaves. He has pointed out that toxins and various metabolic products of the blood of animals are much more poisonous for living plant protoplasm and tissues than for animal protoplasm and tissues. He determined the normal growth of *Lupinus albus* seedlings in plant physiological solution by measuring the average of ten or more seedlings allowed to grow for 24 hours in the dark and then compared the rate of growth in normal blood serum with the rate of growth of these seedlings when

placed in pathological blood serum. In this way he has demonstrated the presence of a toxin in the blood of pernicious anemia which is not present in secondary anemia and other conditions. Thus we now have a very delicate test for differential diagnosis at a very early stage in this disease.

By the same method Dr. Macht has detected the presence of a toxin in the blood of leprosy, which serves to differentiate the blood sera of leprosy from that of tuberculosis and syphilis. He has found that the chaulmoogra oil treatment of leprosy results in the disappearance of the toxic factor ordinarily found in the blood sera of the leprosy patient.

Thus this new tool promises in my opinion to lead to the discovery of specific toxic factors in the metabolism of the body long before definite pathology develops.

The Boyce Thompson Institute for plant research have made pioneer studies of the effects of illuminating gas on various plants. As a result of their researches it has been shown that the tomato plant is about 200 times as sensitive as the human nose and 50 times as sensitive as the best chemical test available to detect the presence of carbon monoxide. It has been recently announced that British submarines and coal mines are to carry tomato plants to detect the escape of these noxious gases. In the presence of carbon monoxide the leaves of the tomato plant droop.

I therefore would like to suggest that you look over the wall into the field of a neighboring specialty and see what is developing there. It may be just a fishing or a vacation trip or it may result in a new approach to the solution of one of your old problems.

In concluding, I hope that I have not given the impression that I would belittle in any sense the orthodox specialist in science. Without him we should not have reached the present state of human knowledge, and to him we must look for future progress. A knowledge of the fundamentals of a neighboring science gives one perspective and prevents lopsidedness. We have had to divide science into branches in order to bring them within the possibilities of individual human endeavor, but such divisions are man-made and should not be permanent. Our specialized knowledge needs to be assembled, correlated, and integrated—we must reconstruct the whole from its parts. My aim has been to point out some of the hazards of specialization with the view of emphasizing the essential unity of science.

Petroleum Research

By William B. Ross

The many problems of an apparently simple industry. Some of the ways in which chemists are improving products and conserving our great natural resources.

PROBABLY no other industry has as many research workers actively engaged, either directly or indirectly, on its problems as petroleum. While the major portion of the research effort in this field is concentrated in the laboratories of the oil companies, many government and university laboratories as well as manufacturers of mechanical equipment and chemicals, both in the United States and in foreign countries, are busily working on the study of petroleum fractions or compounds.

Crude oil obtained from seepages has been known for a great many years. In America until about 1860 the small amount so secured was used for medicinal purposes. In 1859 Edwin L. Drake drilled his experimental well in Pennsylvania, using an adaptation of the method used for drilling artesian wells. The first oil boom followed the successful completion of this well, although practically the only market was for kerosene. The early experimentation (it can hardly be called research) was in the endeavor to increase the yield or improve the quality of that fuel, and while in general the attempt was unsuccessful, some of the work, particularly that of Mr. Hiram B. Everest, did produce other important results. The developments of Mr. Everest (who founded the Vacuum Oil Company in 1866) demonstrated the practicability of producing by improved methods products other than kerosene—notably excellent lubricants—from petroleum, and provided the incentive for the continually increasing investigations without which the industry could not have developed to its present magnitude.

Although the greater portion of research problems in petroleum are not disclosed until their completion, and after the results are ready for utilization, it is safe to divide the research work into the following general classifications:

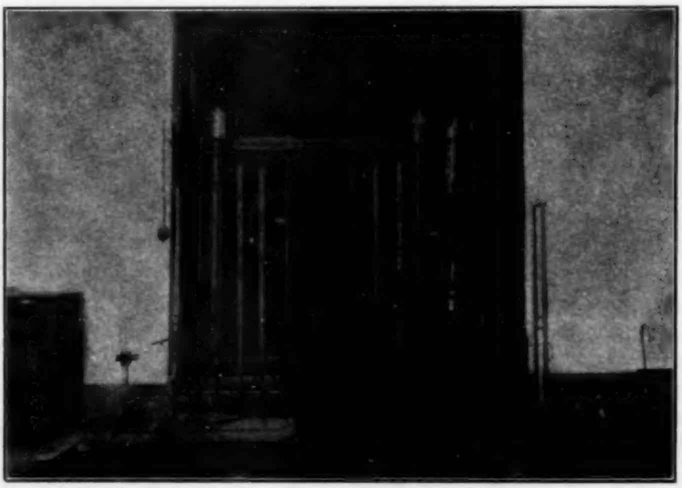
(1) The origin of crude oil; prospecting, drilling, and recovery of crude oil.

(2) Selection of raw materials.

(3) Improvement of products.

(4) Development of new products.
(5) Improvements of processes (cutting costs, increasing yields, etc.)
(6) Development of new processes.
(7) Improved methods of application.
(8) Improvement of test methods and correlation of the results of tests with performance in service.

Because of the large quantities of crude oil produced and consumed annually, it is of great importance to determine whether it is being formed at the present time, to locate new fields and estimate their extent, and to recover the maximum quantity of oil from the present producing fields. The origin of crude oil has been studied intensively in the last few years. The application of geology in the search for oils has been greatly aided by geophysical methods, using the torsion balance, the seismograph, and various electrical devices. Drilling has been improved by better steel for tools, and by the various means for determining the angle of deflection of the hole from the vertical. Repressuring, flooding or water drive, and the use of chemicals for changing the surface tension of oils to sand have been applied to increase the amount of oil recovered from individual wells or entire fields. Mining is also being used for the production of oil to a limited extent.



Apparatus for the Analysis of Liquefied Gases and Low-Boiling Petroleum Distillates

The selection of the raw material, crude oil, is a problem of great importance. Crude oil is extremely complicated in composition and probably contains thousands of compounds. The composition varies from one field to another, and even to some extent from one well to another in the same field. There exist a number of general classes of compounds, the members of which are closely related. Taken as a whole, very little is known regarding the exact composition. Present knowledge, however, does make it possible to determine that some crude oils can be used only as fuel, while others are useful because of the large gasoline yields or because they contain fractions which when properly processed furnish high-grade lubricants.

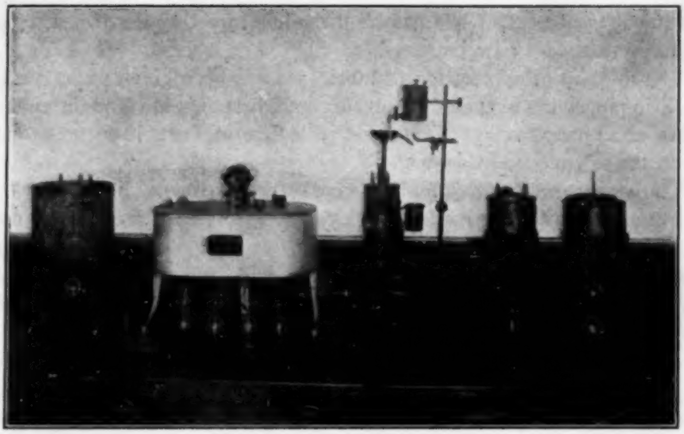
Complexity of the Chemical Problem

The selection of the crude oil depends on the yield and quality of the fractions which it is possible to produce from it, and on the ease with which these fractions can be processed into the finished products. While manufacturing methods control the quality of the products which can be produced from a crude oil, it has not been found possible commercially and competitively to produce from any crude oil fractions all of which are uniformly superior to those produced from other crudes. Lubricating oils produced under the most expert supervision and with the most modern methods from a particular crude oil may be entirely satisfactory for one type of service but inferior for another.

Increased severity of service conditions has required the continual improvement of all classes of products. Insulating and lubricating oils used in circulating systems must be highly resistant to oxidation to prevent large and rapid increase in acidity and sludge formation. Some lubricating oils must be resistant to forming emulsions with water, while others must form emulsions readily. Gear loads in automotive equipment have increased tremendously in the last few years. It has been necessary to develop oils which would give lubrication where the gear tooth pressures are many thousands of pounds per square inch. Another type of service requires a lubricant which is sufficiently fluid to prevent channeling and still will not leak into adjacent parts of the equipment.

Present-Day Improvements

The improvement in the knock-rating of gasolines has been marked, and the gumming troubles which were once almost inevitable with cracked fuels of high anti-knock value have been largely overcome.



VISCOMETERS USED IN VARIOUS COUNTRIES

Gasolines have been produced which give easy starting without vapor lock, excellent acceleration, and maximum power without crankcase dilution.

New products are continually being produced, and much research endeavor is being applied to the utilization of the lower-priced and less readily marketable materials which are obtained in large quantity during the refining operations. Cracking-still gases are converted into solvents. Butane and propane are being separated from natural and cracking still gas. Petroleum waxes, properly separated, refined, or modified, are successfully competing with animal and vegetable waxes and fulfilling requirements which had previously never been met. A tremendous amount of research has been applied to the processes of hydrogenation, polymerization, and synthesis to produce new and improved products.

The Vacuum Oil Company was the first to use successfully vacuum distillation for petroleum. Many years later they were the first to install and operate a high-vacuum pipe still which gave superior products as well as a marked increase in the efficiency and simplicity of operation. Cracking stills have greatly increased the yields of gasoline and improved the anti-knock. Contact filtration has to some extent replaced the older percolation method. Centrifuges, first tried by the Vacuum Oil Company a number of years ago for removing petrolatum from cylinder stocks, have to a large extent superseded cold settling.

Chemical treatment of oils has been modified by the use of new types of equipment and new reagents.

The method of application of lubricants has been given much study, resulting in saving of the lubricant, decreased repairs, lower maintenance costs, and power saving. It is impossible in a brief article even to touch upon the advances in this field.

The study of what might be termed "the theory of lubrication" is too important to be overlooked. While the results are not of outstanding commercial importance, there has been and still is a large amount of work being carried on in this field, and much fundamental knowledge is being obtained which gives promise of excellent results in the future.

Still Much Research to Be Done

As a result of lack of knowledge of the composition of petroleum, there have been developed over many years a large number of purely empirical tests. Many of these tests were of little significance and have been dropped or replaced by others. Some others have been of inestimable value although not based on any fundamental knowledge. Some of these tests are applicable to determining the suitability of an oil for a given service, while others are useful only as a means of identification or for control in refining. Much effort is being devoted to correlating the results of these tests against service conditions, to devising new tests for those that fail to show merit, and to developing fundamental data so that methods of testing will be no longer empirical.

From the preceding it is apparent that research in petroleum requires not only the chemist, but also the physicist and the chemical, the mechanical, the electrical, and the automotive engineer. Patent experts, librarians, mechanics, plant operators, office workers, and many others render their assistance to men actually engaged on the research problem. Research is the tool which is enabling the oil industry to survive in these days of depression and overproduction, and which will insure its profits and expansion in the future.

Colloid Chemist

By Raymond Szymanowitz

A chemist who branched out. History of Edward G. Acheson's graphite research. Some uses of the new colloid.

THE name of Edward Goodrich Acheson has been linked so intimately with electrothermics, that mention is rarely made of the important work he conducted in the realm of colloids. Because of the great dissimilarity between these fields, it is somewhat surprising to find that a single individual has made a distinguished mark in each.

The details of Acheson's creation of silicon carbide ("Carborundum") with apparatus no more elaborate than a plumber's bowl, an arc light carbon, and a few pieces of copper wire, are well known. Both the popular and technical press have frequently carried this story. They have also devoted not a few columns to his later accomplishment which made possible the conversion of all types of amorphous carbon into the graphitic form.

Not much publicity, however, has been given to the fact that Acheson soon found the production of graphite to be one thing and its commercial utilization quite another. Although graphite, as produced in the electric furnace, was exceedingly pure and consequently ideal as a lubricant, the amount consumed for this purpose alone was not sufficient to warrant its manufacture.

A survey made by Acheson at the time revealed that most of the graphite mined was being used for the manufacture of crucibles. With the hope of successfully applying his own product for this purpose, Acheson promptly set about to conduct a series of experiments on suitable binding agents.

In the course of this work, which ultimately took him into the field of colloids, Acheson made a comprehensive study of earthy materials. He found that certain clays, though of similar composition, varied greatly in plasticity. Inasmuch as sedimentary clays were discovered to be generally more plastic than those of the residual type, Acheson attributed this difference to some effect exerted by the water responsible for the removal of the sedimentary clays from their original bebs. Feeling that this change was brought about by organic matter leached from the soils of the fertile regions through which the streams flowed,

Acheson sought to duplicate Nature's processes in the laboratory by treating the non-plastic clays with aqueous extracts of vegetable bodies—straw being used in his initial attempt.

His efforts eventually met with success, and the matter of plasticity no longer constituted a problem. Acheson proceeded to search the literature for the purpose of determining whether anyone had observed this effect before him. The only reference he encountered relating to a similar use of straw, was that which appears in Exodus 5:7-19, describing the brick-making operations of the Egyptians. Acheson, feeling that the Egyptians used the straw to render the clay more plastic rather than as a fibrous mechanical binder, called his treated product "Egyptianized Clay."

Further research revealed that the increase in the plasticity of the poor clays was due to Acheson's having effected a reduction in the size of the particles composing it. Examination of the treated clay, with the aid of an ultramicroscope, substantiated this, proving beyond question that the size of many of the particles was of colloidal dimensions.

As a result of this work, Acheson was the first to offer a logical explanation for the formation of the deltas at the mouth of the Mississippi River. He concluded that the organic matter in this stream and its tributaries had "deflocculated" or colloidalized portions of the soil through which they flowed. This material, upon being converted into the colloidal state, remained in suspension until eventually precipitated at the mouth of the river by the salt waters of the Gulf of Mexico.

APPLYING his colloidalizing process to the abrasive-free, unctuous graphite which he was now producing in large quantities at Niagara Falls, Acheson, through the medium of ultra-filters and other separating devices, introduced to industry highly concentrated colloidal solutions of electric-furnace graphite in both oil and water.

These new preparations were first employed exclusively as lubricants. It was soon learned that colloidal-graphited oil, in addition to solving problems surrounding the operation of machines at high temperatures and heavy pressures, provided a marked improvement over plain oil when used for general lubrication purposes.

If employed consistently, colloidal-graphited lubricants form on friction parts graphoid surfaces which possess the ability to satisfy the surface energy thereof. In addition, graphoid surfaces exhibit a low interfacial tension with petroleum bodies and thus discourage oil film rupture. In the event of ultimate destruction of the protecting oil film, the graphoid surfaces continue to serve as an anti-friction body. In this capac-

ity, they not only prevent metal-to-metal contact but provide dry lubrication until the oil film is again restored.

Suspensions of colloidal graphite in water may be employed as effective lubricants for applications where oil is either objectionable or dangerous. Oxygen compressors and low-pressure steam engines afford good examples. Colloidal-graphited water is also indispensable as a die lubricant in the drawing of tungsten and molybdenum.

Concentrated colloidal solutions of graphite in water, when applied to solids and permitted to dry, are capable of forming tenacious, homogeneous graphite films. These coatings possess a high black body factor, are unusually unctuous, conduct electricity, and are remarkably inert chemically. Graphite films so formed are enjoying a wide application in the manufacture of radio valves, fixed and variable resistors, newspaper matrices, and as a parting compound in certain glass, rubber, and metal-molding operations.

Colloidal-graphited water, when properly employed, also functions as a "getter" in incandescant lamp manufacture and as a clamping paste in the fabricating of therapeutical lamps of the carbon filament type.

It has been found that colloidal graphite is an effective retardant of scale formation when injected into steam boilers, is a valuable adjunct lubricant when suspended in automotive upper cylinder lubricants and spring oils, and is not without utility in biological research, where it is frequently employed in intravenous injections.

It is evident that Acheson's colloids play an important rôle in many branches of science and industry. Furthermore, unlike other colloids which are usually marketed in terms of milliliters, graphite, in the colloidal form, enjoys a consumption of many thousands of pounds annually.

It would seem that one is justified in referring to Edward Goodrich Acheson, electro-chemist, in the manner set forth in the title of this short résumé.

Research in Agriculture

By A. L. Mehring

Scientific research helps the farmer. A defense against pests. Safeguarding the soil.

FOR ages past humanity has been harassed by recurring famines; and one of the major problems has been to provide sufficient food and clothing for the world's constantly expanding population. With the introduction of scientific research into agriculture this problem gradually became less and less troublesome until now we are faced with surpluses. The development of artificial fertilizers, the improvements in varieties of crops and breeds of animals, the invention of labor-saving machinery, the discovery of means of controlling pests and of more efficient methods of doing the many tasks involved in agriculture have all contributed to the production of ample supplies of every kind of food and clothing with less hours of man labor per unit.

For many years, as agricultural production became more efficient, the excess man power no longer required was absorbed in other industries; and this has contributed very largely to the much higher plane on which we now live. At present, however, the labor not needed in agriculture cannot be absorbed in other industries without some drastic readjustment; for nearly all industries are faced with overproduction. The National Recovery Administration may, however, bring about this readjustment.

If scientific research enables the farmer to produce more than he can sell profitably by working the present number of hours on all of his soil, it would appear reasonable for him to work less hours on his best land so that he would have as much time for leisure and recreation as the

worker in other industries. Unless a majority adopt this practice at about the same time, however, it will not work satisfactorily. Agricultural science in itself has no power to prevent farmers from working long hours nor from cultivating land too poor to justify it, but research has built the foundation of knowledge upon which this desirable edifice can be erected by the government or by the farmers themselves with the right kind of cooperation.

This does not mean that the task of science is finished and that agricultural research should cease, because research makes agriculture more efficient in many ways besides enabling the farmer to produce more food and fiber per acre of land. Research shows how to improve quality, it finds new crops and new uses for old crops, it finds ways to produce the same quantity with less labor and expense, it produces cheaper and more efficient fertilizers and insecticides, it shows how to prevent fertile fields from gradually changing into barren fields, it makes life more pleasant in many ways; and it finds means to cope with all sorts of new problems as they arise.

NEW problems are continually arising which threaten disaster to certain sections of our agriculture; and it is here that constant research is indispensable. Those in the best position to know claim that we would face famine in ten years or less if research in the control of insects and plant diseases were stopped. Almost every year a new insect or plant disease previously almost unheard of suddenly becomes epidemic and sweeps like wildfire through large sections. The unaided farmer would be helpless before these unexpected attacks. If disaster is to be avoided, the country must maintain staffs of research workers competent to find means of controlling or eradicating these pests in season and out just as we keep firemen and policemen on hand all the time. After the fire breaks out, it is too late to organize a fire department that will be effective.

Research cannot be stopped and started at will like an engine. It requires years of special study on the part of the scientist and the accumulation of large quantities of costly instruments, chemicals, museum specimens, and scientific books to do this kind of work. In other words it requires many years of arduous planning and preparation to build up a research organization that will be effective just as it requires years for an individual to build up an estate. Some curtailment of scientific research may be justified when funds are difficult to obtain, but at present no institution can abandon research and take it up again at will without paying dearly.

Destruction of a considerable part of a crop may be counted upon to raise prices and is justifiable in an emergency; but it would appear more efficient, where possible, to find some new use for the part of a crop that cannot be consumed in the usual way at fair prices. Chemical research of this kind was never needed so badly as it is now.

PERMANENT limitation of production should be based on the most efficient use of our soil resources. Much has already been done to determine the most efficient use for each soil type and to locate each kind of soil on the map, but much more research will be required to finish this task.

Whether or not a farmer makes a profit on a crop depends upon his cost of production as well as upon the price paid him for it. The interest on the money invested in land, machinery, and equipment, the taxes, wages for labor, feed for the horses, and so forth are all more or less fixed for a farm of a given acreage. If the same sized crop were raised on a smaller farm all of these items would be less but the value of the crop would remain the same. An important way to lower the cost of production is to raise the same crop by cultivating less acres. This can best be done by the use of fertilizers.

Recent studies have shown that the method of applying the fertilizer to the crop is very important in determining its efficiency. The same quantity of plant food can now be purchased for less money in mixed goods containing about 20 per cent than in fertilizers containing 12 or 14 per cent of plant food. In certain sections of the country the farmers have not been taking advantage of this opportunity to save money. These facts, only a few among those that might be cited, show that further investigations in fertilizer technology offer chances of lowering further the cost of production of crops.

The long-continued use of certain types of insecticides and fertilizers may render the soil unproductive. In addition, soil erosion is rapidly robbing the farms in certain sections of their most fertile soil and at the same time increasing the danger of floods by filling up the channels of the rivers. If these practices and conditions are allowed to go on, much of our present agricultural land will be a barren wilderness in the future. These problems are being studied but need still more study.

The cost of agricultural research per person of the total population is only a few cents each year. There are few people indeed in this country, who do not derive benefits from such study worth many dollars in the course of a year, while to many of our farmers it is their only insurance against possible ruin.

The Rollins College Experiment

By F. R. Georgia

Description of the educational laboratory at Winter Park. Autocatalysis in teaching. Education must go on after college.

IN THE fall of 1926, Rollins College embarked on a series of experiments that have aroused a great deal of interest in the educational world.

The first departure resulted in the conference plan of study, the primary purpose being to bring about a more intimate association between student and instructor. Changes included limitation of classes to about twenty students, discarding the formal lecture and recitation systems, encouragement of group discussions, and the use of a two-hour class period.

It should not be assumed that lectures and recitations have been thrown overboard entirely. In many courses, especially those of an introductory nature, a very considerable amount of expository and demonstration work is required in order to obtain satisfactory results. With small classes, however, this type of work can be made quite informal and subject to frequent interruption for class discussion of difficult or interesting points at the time they come up.

The two-hour class period was adopted in order to make it possible for the student to do the work required in a course at a time when the instructor would be available for consultation. In many cases this has developed into a system of individual conferences between instructor and students.

About two years after the conference plan was placed in operation, the faculty organized the work of instruction in three terms instead of on a semester basis, and the following year adopted a concentration plan of study. Prior to this, most courses had met three times a week for two or three terms. Under the concentration plan almost all courses meet five times a week and many of them extend over but one term.

Under the older system a student carried five or six separate subjects or courses at one time, received homeopathic doses of each, and had to indulge in a considerable amount of mental gymnastics in order that he might have his mind occupied with the proper subject at the proper

time. With the change to the concentration plan students carry only three full courses at one time; and since these in general meet five times a week, the continuity of a subject is not interrupted by intervening days between class meetings. With fewer things to occupy the student's attention, he has a better chance of real accomplishment.

The latest developments, put into effect last fall, include many far-reaching departures from orthodox methods, and were adopted by the faculty of the college only after long study and deliberation.

These latest changes include:[1]

1. Dividing the college into an upper and a lower division.
2. Provision for a sufficient distribution of work in the lower division to give the student a broad foundation upon which to build later work.
3. Provision in the upper division for intensive work of such character that effective mastery of a field is obtained.
4. Elimination of the evaluation of the baccalaureate degree in terms of courses, hours, points, or length of residence.
5. Provision for two comprehensive evaluations of each student's work, the first occurring when he applies for admission to the upper division and the other when he completes the work of the upper division.

Admission to the upper division depends on the student demonstrating to a board of admissions that he possesses the required degree of competence in English, at least one foreign language, mathematics, history, physics, chemistry, biology, and social and economic institutions, and that he is maintaining himself in a condition of physical fitness. He must show also that he has engaged in the profitable pursuit of additional academic work, extra-curricular activities, and in the development of general mental abilities, moral characteristics, and the appreciation of the fine arts and of nature. In addition he must have acquired sufficient maturity to enable him to make an intelligent selection of a field of specialization for his work in the upper division.

This system of evaluation has made possible the elimination of course credits and all required courses. A student is permitted to fit himself to meet requirements in such manner as he sees fit, whether by attending courses or by independent work. If any course is elected, the student must conform to such regulations as are prescribed by the instructor in charge.

[1] For complete details consult the current catalogue of Rollins College.

Instructors grade students as low, satisfactory, or high in accomplishment, scholarship, application, attitude, development, mental adility, and integrity. These reports do not constitute course credits, but may be used as a source of information by the committees that evaluate the student's work.

ALL of the provisions of the plan have been framed with the purpose of forcing the student to assume the initiative. The educational significance is very aptly illustrated by comparison with catalysis in chemical reactions. If we define a catalyst as a substance that modifies the velocity of a reaction without itself becoming a part of the product, we see that the teacher plays an identical rôle in education. If we carry the analogy further and classify catalysts as transfer, contact, and autocatalytic, we will find teachers who correspond to all of these types.

It is probable that most teachers act as transfer catalysts. They act as conveyors that take information from a convenient source of supply and dumpt it into more or less receptive students. The lecture system is the best example. The recitation system differs chiefly in that the teacher passes the rôle of transfer catalyst over to a textbook in order that he may spend his time as a detective. Even in their worst forms both lecture and recitation produce results of a sort, and they can be made to produce excellent results when properly used as adjuncts to other methods. This is especially true in introductory courses.

Some teachers seem endowed with qualities that call forth unusual scholastic efforts from their students: a process of contact catalysis. This process requires not only a teacher of high caliber, but it also requires that he shall not spread his efforts over too many students. Because this process calls for a greater effort and greater participation by the student, the results obtained should be greatly superior to those resulting from mere transfer.

An autocatalytic reaction is one which starts very slowly, but which, once initiated, is catalyzed by the products formed. As in the chemical reaction, so also in autocatalytic education, we find an initial lag, but this can be shortened or eliminated by proper use of a transfer or contact agent. Education should not slow down when a student leaves school; and it will not, if some autocatalytic process can be set going.

The introduction of the conference plan at Rollins provided conditions favorable to the contact process in education; the more recent changes foster autocatalysis, by forcing the student to assume the initiative while he is still in college and thus acquire the habit of intellectual effort without the need of outside stimulation.

The Business of Chemistry

By Paul A. Thomasset

THE chemist, as has already been many times stated in the past, lacks, to a great extent, the desire and the necessary training to appreciate fully the commercial side of his pursuit. Too few remember that their work must eventually translate itself into hard cash. A more intense realization of this would open to many chemists possibilities that are to a large extent now neglected. It has been my experience, unfortunately duplicated by many others, to see a tremendous amount of work, time, and money wasted on the improvement of products already quite satisfactory, in order to match competitive articles. Although it would be absurd to suggest that every product has reached its highest state of perfection, in many cases the so-called improvements are purely imaginary and are forced by competitive conditions in a particular industry.

It is very easy for a prospective customer to turn down a product on the basis that the article offered melts at 140.2° C. while his present supply melts at 140.3° C., or that the whiteness of his product is slightly higher than the other. The fact that in actual use these differences are of no moment is completely disregarded.

The laboratory promptly engages in lengthy and often expensive investigations, to remedy the deficiencies and if possible to improve upon the competitive product. If successful, it is only a question of time before the work has to be started all over again to surpass another product which has meanwhile appeared on the market.

It is seldom that the chemist engaged in this work knows fully what happens to his product after it is sold. A more profitable line of work would consist in searching for new or improved methods of use for the products manufactured. Very often a sale can be quickly brought about if the manufacturer gives detailed information for using a product. It is not a good sales policy to ask the customer to take time to discover for himself how the product can be used to his satisfaction. The laboratory can be of considerable use in this fashion, and the chemist's initiative can have freer play.

Another field open for the chemist is in the manufacture of specialties. In a great number of industries manufacturing chemicals, it is impossible for the average chemist, unless unusually connected, to think of going in business on his own account. Many products to be manufactured

economically require the initial expenditure of vast sums of money. However, many products can be manufactured on a small scale requiring little equipment, and can be sold at a fair profit. A number of these products are manufactured by men who have no technical training and have arrived at a more or less satisfactory article through hit-or-miss methods. The chemist, with his greater knowledge of the factors at work, can, in many instances, so improve this type of chemical as to obtain, at least on the technical side, a distinct advantage over the other type of manufacturer. Many chemists, now unemployed, could find a profitable use of their training and experience in this manner. It is often forgotten by many that possibilities of making a living exist outside of working for someone else.

Of greater importance and possibilities are executive positions in larger firms. The management of these large concerns is naturally improved if composed of men who are thoroughly familiar with the products manufactured in their own industry. In many organizations these men are increasingly being recruited from the technical staff. The position naturally represents opportunities for greater earnings and initiative. At the same time, it is obvious that in most cases, only men who can see further than the walls of a laboratory have a chance to secure these better positions. Familiarity with the commercial side of the work, through business training, reading of trade journals, contact with business people, will prove a worth while investment.

This short article obviously covers a very few points of contact between business and chemistry, and is written with the hope that it may suggest still wider opportunities.

INSTITUTE NOTES

National Council

The one-hundred and fifth meeting of the council was held at The Chemists' Club on Thursday, October 19, 1933, with President Henry G. Knight presiding. The following councilors and officers were present:

Messrs. Morgan, Neiman, Zons, and Miss Florence E. Wall.

President Knight read a letter from C. C. Williams, Deputy Administrator of the NRA, in reply to our letter of offer of assistance to the NRA in codes relating to chemists. An extended discussion was held as to the advisability of submitting a code for chemists, and the character of such a code, if submitted. In view of the uncertainty as to whether professional men are actually within the NRA, and in view of some of the codes adopted, it was suggested that the matter be held in abeyance in order that the discussion upon the subject to be held the following night at the meeting of the New York Chapter could be considered; and Miss Wall offered to submit a report to President Knight upon this meeting of the New York Chapter.

The Secretary was directed to request the chairmen of the several chapters to appoint three active members of each chapter to act upon a new membership committee, the National Council to direct its attention to fields outside the territory of the respective chapters.

The Secretary was requested to write Dr. Van Doren, chairman of the committee on constitutional revision, to submit a suggested form of revised by-laws at the earliest possible moment.

HOWARD S. NEIMAN, *Secretary*

Pennsylvania Chapter

The 1933–34 season was opened on September 16, 1933, by a trip through the Morris Arboretum, recently acquired by the University of Pennsylvania. A picnic supper was postponed because of threatening weather.

The first meeting of the season was held at the Harrison Laboratory of the University of Pennsylvania on October 16, 1933, Dr. William Stericker presiding. Dr. Stericker reported that the Technical Service Committee will need about one-half of last year's budget.

Mr. William Levitt of the Corning Glass Works gave a demonstration of glass blowing, to an intensely interested audience numbering over 140.

The November meeting was held on November 7, 1933, at the Engineers' Club with Dr. Stericker presiding. Dr. Stericker, Mr. Cayo, and Mr. Nydick discussed the work of the Technical Service Committee and the new plan whereby a fee would be charged of all persons securing work through the committee. Mr. Cayo asked for suggestions as to procedure in starting a New Jersey chapter. Mr. Rivise reported that the Franklin Institute will have facilities available for technical meetings.

The principal speaker of the evening was Mr. G. K. Kearney of the *Philadelphia Ledger*, who discussed taxation. The talk was very interesting and everyone took an active part in the discussion.

C. W. Rivise, *Secretary*

New York Chapter

The October meeting was held at The Chemists' Club, with Chairman Baker presiding.

Reports of Committees:

By-laws: ready for next meeting.

Membership: by Mr. Herstein.

Publicity: by Miss Wall.

Program: by Mr. Baëza.

NRA: by Mr. Wright.

The chairman announced there would be no joint meeting on Dec. 15th.

Unemployment Committee: Mr. Breyer reported that the first meeting of the committee will be held next week.

The addresses of the evening discussed the relationship between The Institute and the chemist.

Dr. Baker covered the "Institute Problems Today," and Dr. Wright discussed the future.

The following motion was made, seconded and unanimously carried:

> Whereas it is the sense of this meeting that The American Institute of Chemists as an organization is best qualified to define the classification of workers in chemistry and whereas the findings of the licensing committee may well be used as a basis for this classification, therefore be it
>
> *Resolved* that the New York Chapter recommends to the National Council that, pending further investigation, said report be used by the Council in deciding and answering any questions as to classifications submitted by the administration of the NRA.

Motion was made and carried to appoint a committee to wait on Mr. Neiman to explain urgency of action. Mr. Herstein was appointed chairman.

It was suggested a meeting be held to consider publicity aid. The following means were suggested:

(*a*) Members sign correspondence with FAIC after signature.

(*b*) Ten articles on the romance of chemistry be written and sold to daily press as a feature series.

(*c*) Name tags at meetings.

Some Obligations and Opportunities

By Ross A. Baker

The A. I. C. is proud of its consistent, steady growth and of the character of its membership. In spite of misunderstandings in some quarters as to its intentional functions, the Institute stands in bold relief as a virile professionalizing agency which is not limited to any particular field of chemistry or to any group of chemists.

Every factor which affects the status of the professional chemist—his personality, his health and his professional training, employment, recognition, and advancement—all are of vital importance, not only to the individual but also to the profession. Some of these factors have been repeatedly stressed and need no elaboration here. The Institute is already on record with respect to the "calibration" of chemists, associates, etc., the ethics of the profession and licensing. More recently we have cooperated with the NRA in the matter of codes which affect chemists.

Professional standards can be achieved only through professional education. Hence each chapter of the Institute should interest itself dynamically in local problems of chemical education. It should (1) properly advise, direct and, if necessary, deter those who contemplate entering chemistry as a career, (2) advise educational institutions regarding chemical curricula, and (3) insist upon high professional standards for teachers of chemistry at all levels.

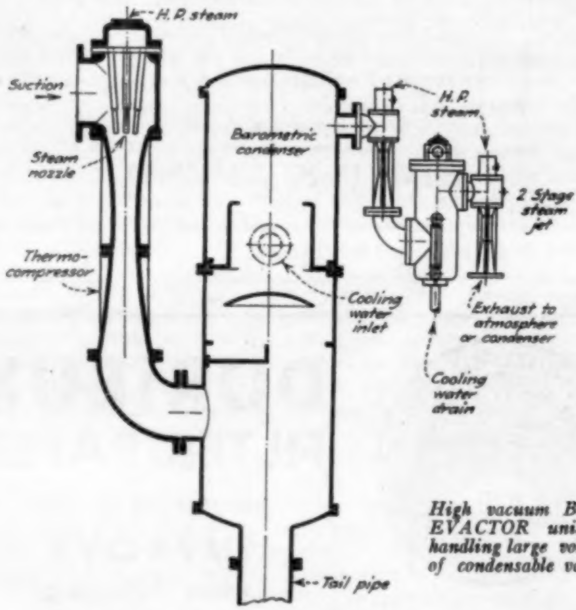
We, who are instructing succeeding generations of young chemists, insist that a teacher of chemistry should consider himself and should be considered by others as a professional chemist first and a teacher second. We view with alarm the employment of "educationalists" who by divine right can teach *any* subject. It seems preposterous that anyone should be allowed to handle chemistry classes without rigorous training in the subject.

The Institute should look apprehensively at each generation of young chemists as they are being groomed to enter the race. Instead of being jealous of these youngsters who are destined to displace the rest of us, we should seek earnestly to improve their quality. The responsibility for this improvement is ours, not theirs. Is it too much for the Institute to demand that no student be graduated as a chemical major or chemical engineer unless and until the chemistry department is prepared to place its stamp of approval on him and to recommend him to the profession?

There is immediate need for the Institute to get acquainted with chemistry teachers and students everywhere, and to study their unique problems. The establishment of student prizes and student chapters are obvious steps in which I am sure teachers will cooperate wholeheartedly. I am glad to report that the New York chapter has planned for the near future a joint meeting with the Chemistry Teachers Club of New York, which has a membership of over two hundred wide-awake teachers.

SPECIALIZED EXPERIENCE IN HIGH VACUUM PROCESS WORK

When first founded Croll-Reynolds Company specialized exclusively on the design, manufacture and application of steam jet vacuum equipment for a number of years. More than a thousand installations have been made including practically every commercial application of vacuum to industrial process work. In the past decade facilities have



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been increased to permit the building of complete Croll-Reynolds processing units including a variety of heat transfer apparatus, kettles, vacuum coolers, vacuum crystallizers and special vessels. Any problems in these and related fields will be given expert attention.

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